

Applicant: Cryan et al.
Application No.: 10/768,966

REMARKS/ARGUMENTS

Claims 1-11 are currently pending in this application. Claim 10 has been amended to correct a typographical error. No new matter has been added to the application.

In the Action, claims 1-5 and 10-11 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,360,372 to Maciejko. Claims 7-9 were also rejected under 35 U.S.C. §103(a) as being unpatentable over Maciejko. Applicants respectfully traverse these rejections.

In forming the Section 103 rejection of claims 1-5 and 10-11, the Examiner takes official notice that although Maciejko fails to suggest or disclose a graded index fiber, as recited in claims 1 and 10,

it would have been obvious at the time the invention was made [to] a person having ordinary skill in the art to have arranged [a] fiber [having unclad filaments] into a graded index fiber as required by the application... [and] it would have been obvious at the time the invention was made to a person with ordinary skill in the art to have placed additional rods in a predetermined arrangement with different indices in the preform to obtain the desired refractive index of a optical fiber.

See Office Action, page 2, last paragraph and page 3, 1st paragraph. Applicants respectfully reject the Examiner's contention, and pursuant to MPEP 2144.03(b) request that the Examiner provide a reference in support of the assertion that forming a graded index fiber according to claims 1 and 10 would be obvious as it is clearly absent from the known prior art.

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The present invention is directed to graded index fiber comprising a drawn and fused preform including a plurality of low index rods, each having only a single refractive index, and at least one high index rod, having only a single refractive index, the drawn and fused preform being configured so that a mode of light transmitted from a first end to a second end is substantially maintained, as recited in claim 1. In another aspect, the invention is directed to a method of making a graded index fiber comprising arranging a plurality of low index rods, each having a single refractive index, and a plurality of high index rods, each having a single index of refraction, in a predetermined pattern to form a preform, heating the preform, and drawing and fusing together the preform such that the relative position of the low index and high index rods is maintained, wherein the preform is configured such that a mode of light transmitted between the first and second ends is generally maintained, as recited in claim 10.

In contrast, Maciejko discloses several clad optical fibers (10) grounded into a bundle (12) and heated to fuse the optical fibers (10) into a fused bundle (14). The fused bundle (14) is drawn into a single fiber (16) of multi-filament character. See column 2, lines 19-35. According to Maciejko, unclad fibers may be used to fabricate a multifilament fiber. However, Maciejko states that "mode scrambling will occur [when unclad fibers are utilized] before the output end of the element". See column 2, lines 56-60. Maciejko fails to suggest or disclose a drawn and fused preform

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configured so that a mode of light transmitted from a first end to a second end of the preform is substantially or generally maintained, as recited in independent claims 1 and 10. This is provided by the graded index fiber according to the invention. By contrast, Maciejko discloses an element having a plurality of filaments fused together "to give a random refractive index across the element". See Maciejko, claim 1.

Maciejko asserts that an object of the invention is to provide a fiber with a plurality of filaments having different refractive indices "whereby light propagating from one end of the body to a remote end thereof traverses an optical path different in length from an optical path traversed by light propagating along another filament". See column 1, lines 45-48. This permits light directed by a laser through an input of such fiber to have its relative phases scrambled at an output end of the fiber. See column 1, lines 34-37. The purpose of the disclosed fiber (10) is to scramble modes to reduce speckle and modal noise of a light transmitted through the fiber (10). See column 1, lines 5-39. Moreover, Maciejko asserts that if some *unclad* filaments are utilized in a fiber (10), mode scrambling will occur before an output end of a fiber and that "the extent of scrambling depends on the ratio of clad (18) to unclad (24) filaments produced". See column 2, lines 59-60. Clearly, Maciejko fails to suggest or disclose a drawn and fused preform configured so that a mode of light transmitted from a first end to a second end is substantially or

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generally maintained, as recited in independent claims 1 and 10. Contrary to the present invention, the Maciejko fiber (10) is specifically configured to induce mode scrambling which is the opposite of the present invention.

In addition to a showing that cited references teach or suggest all recited claim limitations, to establish a *prima facie* case of obviousness under Section 103, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings". Further, "there must be a reasonable expectation of success." See MPEP § 2143.

Modifying Maciejko as asserted by the Examiner would produce a device which would be *less* efficient at scrambling modes. As discussed above, the intended function of the fiber (10) disclosed by Maciejko is to scramble modes to reduce speckle and modal noise of a transmitted light. Therefore, modifying the teachings of Maciejko as suggested by the Examiner would produce a device which is unsatisfactory for its intended purpose of scrambling modes. "If [a] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." MPEP 2143.01, pg 2100-131, quoting *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Further, as discussed above, Maciejko indicates that unclad filaments in a fiber would tend to scramble modes, implying

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that the greater ratio of unclad fibers used, the greater the extent of mode scrambling. See column 2, line 60. Accordingly, Maciejko teaches away from using a plurality of rods having a single refractive index to maintain a mode of transmitted light, as recited in claims 1 and 10. Pursuant to MPEP 2143.01, such teaching away indicates a lack of motivation to combine the teachings of Maciejko with the knowledge being imputed in the Action to those skilled in the art.

In view of the above, Applicants respectfully submit that firstly, Maciejko combined with the knowledge incorrectly alleged in the Action to be available to those skilled in the art fails to suggest all of the claim limitations of claims 1 and 10, and secondly, there is no motivation provided in the Maciejko or elsewhere in the prior art to combine Maciejko and the knowledge alleged in the Action to be available to those skilled in the art to achieve Applicants' claimed invention. Accordingly, only by using impermissible hindsight may this combination be achieved. Thus, *prima facie* obviousness can not be established.

Applicants respectfully submit that claims 1 and 10 are patentable over Maciejko. Claims 2-9 and 11 depend from one of claims 1 and 10, and therefore, these claims are also patentable over Maciejko. Applicants respectfully request withdrawal of the Section 103 rejection of claims 1-5 and 10-11 and the Section 103 rejection of claims 7-9.

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Claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Maciejko as applied to claim 1, and further in view of U.S. Patent No. 6,091,872 (Katoot). Applicants respectfully traverse this rejection.

Katoot fails to remedy the deficiencies of Maciejko. Specifically, Katoot fails to suggest or disclose a fused preform configured so that a mode of light transmitted from a first end to a second end is substantially maintained, as recited in claim 1. Further, Katoot fails to provide the missing motivation to combine the teachings of Maciejko with the knowledge alleged to be available to those skilled in the art. Accordingly, Applicants respectfully submit that claim 6 is patentable over Maciejko in view of Katoot.

Applicants respectfully request withdrawal of the Section 103 rejection of claim 6 citing Maciejko in view of Katoot.


If the Examiner believes that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

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In view of the foregoing remarks, Applicants respectfully submit that the present application, including claims 1-11, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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DPD/vs
Enclosures